

A VISUALIZATION OF SENTIMENT ANALYSIS OF GLOBAL NEWS ON SOCIAL MEDIA: A CASE STUDY OF CNN, BBC, AL JAZEERA AND REUTERS

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ABSTRACT

The rise of social media platforms has changed the landscape of public speech, allowing people to engage in real-time conversations and express different opinions on global events, thereby playing an important role in shaping public opinion. It has influenced the way the media writes headlines and communicates with their audiences. However, this approach raises questions regarding how media posts may influence public opinion and perception, which is the reason for this paper. This study examines the sentiment distribution and audience engagement patterns of four prominent news channels: CNN, BBC, Al Jazeera, and Reuters on social media platforms. Through an Exploratory Data Analysis (EDA), Python programming language was used to analyze a secondary data and visualize sentiment analysis of engagement metrics such as likes, comments, and shares, the study investigates how different news channels convey information and interact with their audience. Findings reveal strategies and audience preferences, with Al Jazeera exhibiting a notable emphasis on negative news content, while BBC maintains a balanced approach with predominantly neutral posts. CNN and Reuters demonstrate varied sentiment distributions. The study underscores the importance of aligning editorial focus with audience preferences while upholding journalistic integrity in the digital age. Limitations regarding data type, social media engagement metrics, and sample bias are acknowledged, providing insights for future research endeavors in media studies and data analytics.

KEYWORDS: Data Visualization, Exploratory data analysis, Sentiment Analysis, VADER

1. INTRODUCTION

The fast growth of social media platforms over the last decade has changed the landscape of information sharing hereby having a significant impact on public debate and society perception (Tufekci, 2018). With billions of daily users, platforms such as Facebook, Twitter, and Instagram serve as virtual places for news, views, and narratives to conflict, affecting our collective perspective of world events (Slavina and Brym, 2020). This level of digital connectedness has blurred the lines between traditional media and online news, enhancing social media's influence on news content delivery and reception.

The rise of social media has transformed the way the media write headlines and communicate with their viewers (Mellado & Hermida, 2022). The Press which was formerly limited to print and television, today use social media platforms to provide real-time updates, multimedia information and interactive experiences to their followers (Bruns, Highfield & Burgees, 2013). However, this shift in broadcast approaches raises questions regarding how media posts may impact public opinion and perception (Chadwick & Dennis, 2017). The virality and reach of social media enhance the effect of news material, thus media outlets must carefully examine the tone and attitude represented in their posts.

Sentiment analysis, a subfield of natural language processing which provides a systematic method of evaluating the emotional tone and polarity of textual information (Pang & Lee, 2008). Sentiment analysis is a helpful tool for investigating how news sources engage with their audiences on social media platforms (Thelwall et al., 2010). By analyzing the sentiment expressed in the posts shared by CNN, BBC, Al Jazeera, and Reuters, the paper aim to uncover patterns, trends, and discrepancies in their messaging strategies. This analysis will provide insights into the underlying emotional cues that shape audience perception and engagement with news content on social media.

The goal of this research paper is to conduct a comprehensive sentiment analysis of global news posts on social media, focusing on four prominent news channels: CNN, BBC, Al Jazeera, and Reuters. It aims to investigate how various news outlets influences public opinion and society views of current affairs by closely examining the attitude expressed in their social media posts.

1.1 Research Questions

The research aims to answer the following questions:

- What is the overall sentiment expressed in the posts shared by CNN, BBC, Al Jazeera, and Reuters channels?
- Which news channel tends to have the most positive, negative and sentiment in their social media posts?
- How do engagement metrics such as likes, comments, and shares correlate with the sentiment of the posts?
- What is the frequency of Positive and Negative Words used in their post?

2. LITERATURE REVIEW

2.1 Social Media Posts:

The rise of social media platforms has changed the landscape of public speech, allowing people to have real-time conversations and express varied opinions on global events (Boyd & Ellison, 2007). According to Tufekci (2018), social media has an important role in shaping public opinion, promoting civic engagement, and amplifying the voices of neglected people. However, experts warn against the spread of disinformation, echo chambers, and polarization caused by algorithmic and selective exposure on social media platforms (Bakshy et al., 2015). Understanding the patterns of social media conversation is critical for understanding its influence on society views and making educated decisions.

The integration of social media into news dissemination strategies has reshaped the practices of media organizations worldwide (Mellado & Hermida, 2022). News outlets leverage social media platforms to deliver breaking news updates, multimedia content, and user-generated contributions, thereby extending their reach and enhancing audience engagement (Cui, Kumar & Orr, 2023). However, this shift towards digital-first reporting also poses challenges regarding editorial standards, trustworthiness, and audience interaction (Mitchelstein & Boczkowski, 2023). Research exploring the evolving role of news media in the digital age underscores the need for adaptive strategies that balance journalistic integrity with audience expectations in online environments.

2.2. Sentiment Analysis

Sentiment analysis, also known as opinion mining, has emerged as a powerful tool for analyzing textual data and extracting subjective information regarding sentiment, mood, or opinion expressed within the text (Alqaryouti et al., 2024). Within the context of media studies, sentiment analysis offers valuable insights into audience reactions, editorial biases, and media framing techniques employed by news organizations (Thelwall et al., 2010).

Kumar et al. (2018) examined a dataset extracted from the Facebook pages of five popular news channels, which included 0.15 million news posts and 1.13 billion user reactions. The findings of their experiment revealed that the sentiment of user opinion is strongly related to the sentiment of the news post and the type of information source. While Rieis et al. (2015) used several sentiment analysis techniques to conduct a study using 69,907 headlines generated by the New York Times, BBC, Reuters, and Dailymail. The researchers examined the sentiment polarity of news headlines by extracting information from their text. The study concluded that the polarity of the headline had a significant influence on the popularity of the news piece. According to the study, negative and positive news headlines evoked more interest than neutral ones.

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Researches have demonstrated the utility of sentiment analysis in analyzing news content on social media platforms, enabling researchers to uncover patterns, trends, and discrepancies in the emotional tone and polarity of news coverage (Lu et al., 2024). By applying sentiment analysis techniques to the social media posts of CNN, BBC, Al Jazeera, and Reuters, this study aims to

elucidate the underlying sentiment distribution and its implications for audience engagement and perception of news events.

However, it is essential to acknowledge the inherent challenges and limitations associated with sentiment analysis, particularly in the context of analyzing news content on social media platforms (Avalle et al, 2024). The ambiguity of language, sarcasm, and cultural nuances pose significant challenges for accurate sentiment classification, leading to potential inaccuracies or biases in the analysis results. Additionally, the dynamic nature of social media platforms, where news content is often shared, reshared, and commented upon in real-time, adds complexity to sentiment analysis tasks (Seet & Tandoc, 2024).

2.3. Data Visualization

Data visualization plays a crucial role in transforming complex datasets into accessible and interpretable visual representations, facilitating insights and understanding (Ward et al., 2015). Within the realm of media studies and social analytics, data visualization techniques are instrumental in conveying trends, patterns, and relationships inherent in news content and audience engagement metrics (Diakopoulos, 2018).

By leveraging visualizations such as pie charts, bar graphs, and word clouds, researchers can effectively communicate findings regarding sentiment distribution, engagement patterns, and thematic trends across different news channels on social media platforms (Lopezosa, Pérez-Montoro & Guallar, 2022). Furthermore, interactive data visualizations enable users to explore and interact with the data dynamically, fostering deeper engagement and facilitating hypothesis generation and testing (Babu & Kanaga, 2022). In the context of this study, data visualization techniques will be employed to present findings regarding sentiment analysis results, audience engagement metrics, and comparative analyses of news content across different channels, thereby enhancing the accessibility and interpretability of the research findings.

2.4 Related works on Sentiment Analysis of Media Posts

Several studies have looked at the relationship between social media, news transmission, and its sentiments, offering light on the complex processes that shape modern media landscapes. Bakshy et al. (2015) investigated exposure to ideologically varied news and opinion on Facebook,

highlighting the significance of algorithmic curation in molding users' information consumption. This study emphasizes the significance of understanding the computational principles behind social media platforms in explaining their influence on news consumption habits and ideological polarization.

Additionally, Bruns and Highfield (2016) examined the role of Twitter in facilitating public deliberation and participatory culture, highlighting the platform's potential as a virtual public sphere where diverse voices converge to discuss and debate pressing issues. By analyzing the structure and dynamics of Twitter conversations, the study offers insights into the evolving nature of public discourse in the digital age, emphasizing the need for inclusive and accessible platforms for democratic engagement.

Within the domain of sentiment analysis and media studies, scholars have explored the application of computational techniques to analyze news content and audience responses. Shen et al. (2022) investigated the impact of news events on the stock market by analyzing news sentiment and data mining techniques. The study revealed the predictive power of sentiment analysis in anticipating market trends and investor sentiment, highlighting the potential of computational methods in informing financial decision-making. Furthermore, Tandoc Jr. et al. (2018) examined the phenomenon of "fake news" and its implications for media credibility and audience trust. Through a content analysis of news articles and social media posts, the study elucidated the mechanisms driving the spread of misinformation and its impact on public perceptions of journalistic integrity. These studies contribute to the growing field of sentiment analysis by exploring its applications in diverse contexts and shedding light on the complex interplay between media content, audience engagement, and societal perceptions.

3. METHODOLOGY

3.1. Data Collection

The data used in this study contains Facebook posts and reviews of four media houses, CNN, BBC, Al Jazeera, and Reuters, spanning across various global events, topics, and narratives. The data was scrapped by Kanchana and submitted to Kaggle's public domain for researchers to derive trends from. The dataset consists of 3,753 rows and 4 columns, which was uploaded in February 2024. The Columns are "Text" which is title or main content of the post made by the

media house, “Likes” the number of likes each post has garnered, “Comments” the number of comments left by viewers and “Shares” which shows how many times the post has been shared.

3.2. Data Analysis

This data was analyzed using exploratory data analysis (EDA) techniques: data cleansing, data transformation, data characterization, data visualization and data interpretation. Python programming language with the use of Numpy, Pandas and VADER was used for analysis of sentiment. And WordClouds and Matplotlib were used for data visualization.

Exploratory data analysis (EDA) is a method of data analysis that enables researchers to discover patterns and structures in their data. According to Sahoo et al. (2019), EDA is particularly helpful for spotting unexpected patterns and associations in large datasets, as well as for creating novel ideas that may be tested further.

3.2.1. Data cleansing

The first step in the EDA process was to remove any errors or inconsistencies in the data. The data was cleaned using Python’s Pandas. Firstly, the data of the four media houses were joined as one, an ‘id’ column was added to distinguish the media houses in the dataset, duplicates and null values were removed, incorrect data types or formatting issues were addressed and unwanted characters were removed.

3.2.2. Data transformation

Once the data was cleaned, the customer ‘text’ column was then analyzed using VADER (Valence Aware Dictionary and sEntiment Reasoner) algorithm, which is a lexicon and rule-based approach to sentiment analysis as to identify the score of sentiment expressed in each post. This further aggregated the data by relevant dimensions, such as listing if media’s post sentiment polarity was Positive, Neutral or Negative; hereby creating derived variables to capture additional insights.

VADER was developed by Hutto and Gilbert in 2014 as an improvement over existing sentiment analysis tools that struggled with the nuances of human language (Hutto & Gilbert, 2014). By combining the individual word valence values and making adjustments based on a set of criteria

that take into consideration the context and grammatical structure of the text, VADER utilizes a method known as sentiment intensity scoring. The valence ratings range from -1 to +1, with -1 denoting very negative feeling, +1 strongly positive sentiment, and 0 a neutral attitude (Hutto & Gilbert, 2014).

3.2.3. Data characterization

After the data was cleaned, it was characterized by exploring its structure and content. This included generating summary statistics and visualizing the data to gain a better understanding of its distribution and relationships.

3.2.4. Data Visualization

The data collected was then visualized using WordClouds and Matplotlib, which allows for a clear and concise representation of the data, which facilitated the analysis process.

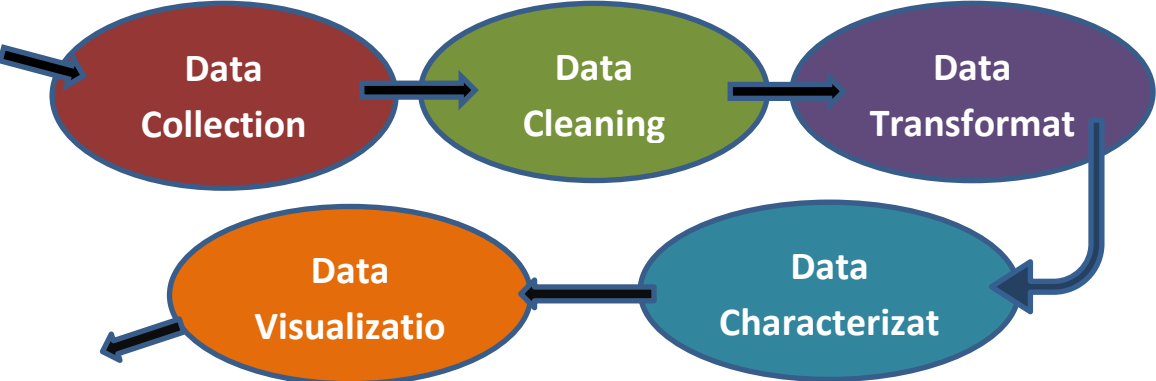


Figure 3.1. Exploratory Data analysis Process

4. RESULTS AND ANALYSIS

This section summarizes the findings of the conducted analysis. This report is based on trends uncovered by the research:

4.1 What is the overall sentiment expressed in the posts shared by all news channel?

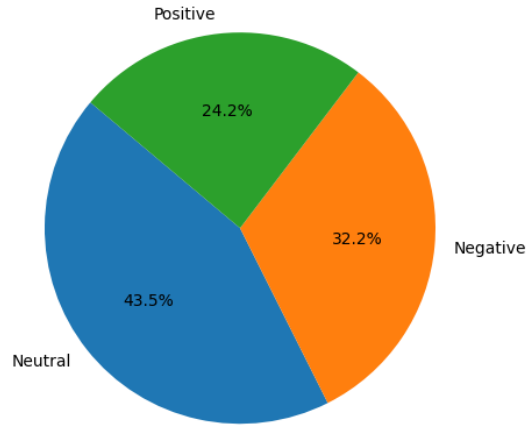


Figure 4.1. Overall sentiments expressed by the News Channels

The pie chart 4.1 depicts the distribution of sentiment in posts made by four prominent news media outlets, revealing that a significant portion, 43.5%, of their content are categorized as neutral. 32.2% leans towards a negative sentiment, while only 24.2% of the posts convey a positive tone. This analysis underscores the prevalence of neutral and negative sentiment in the social media content shared by these news organizations, highlighting potential implications for audience engagement and perception of news events.

4.2. Which news channel tends to have the most positive, negative and sentiment in their social media posts?

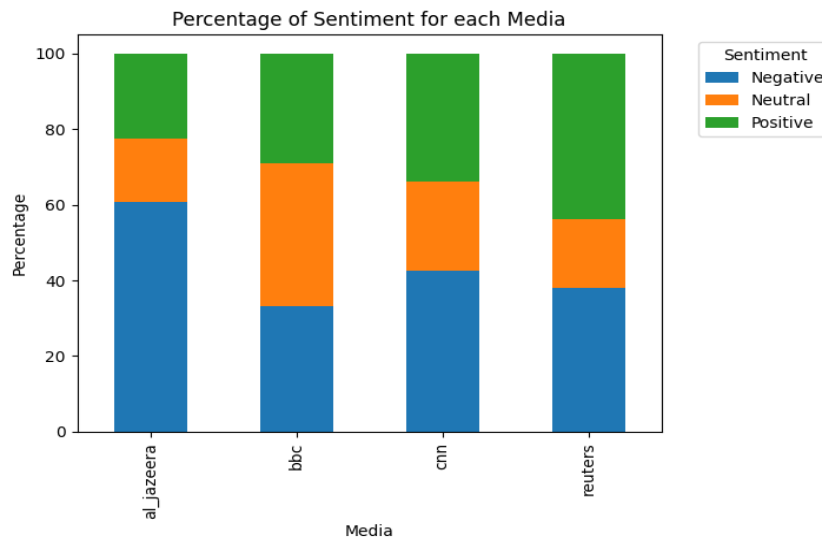


Figure 4.2 Percentage of Sentiment polarity per media

The figure 4.2 shows that Al Jazeera stands out with approximately 60% of its posts categorized as negative news, indicating a predominant focus on critical or adverse topics. In contrast, BBC's posts predominantly fall within the neutral category, suggesting a balanced approach in conveying news content without significant bias towards positive or negative sentiments. Conversely, CNN and Reuters exhibit a more varied distribution, with a substantial portion of their posts categorized as either positive or negative. This disparity suggests differing editorial priorities and communication strategies among the news channels, underscoring the nuanced dynamics of news dissemination on social media platforms.

4.3. How do engagement metrics such as likes, comments, and shares correlate with the sentiment of the posts?

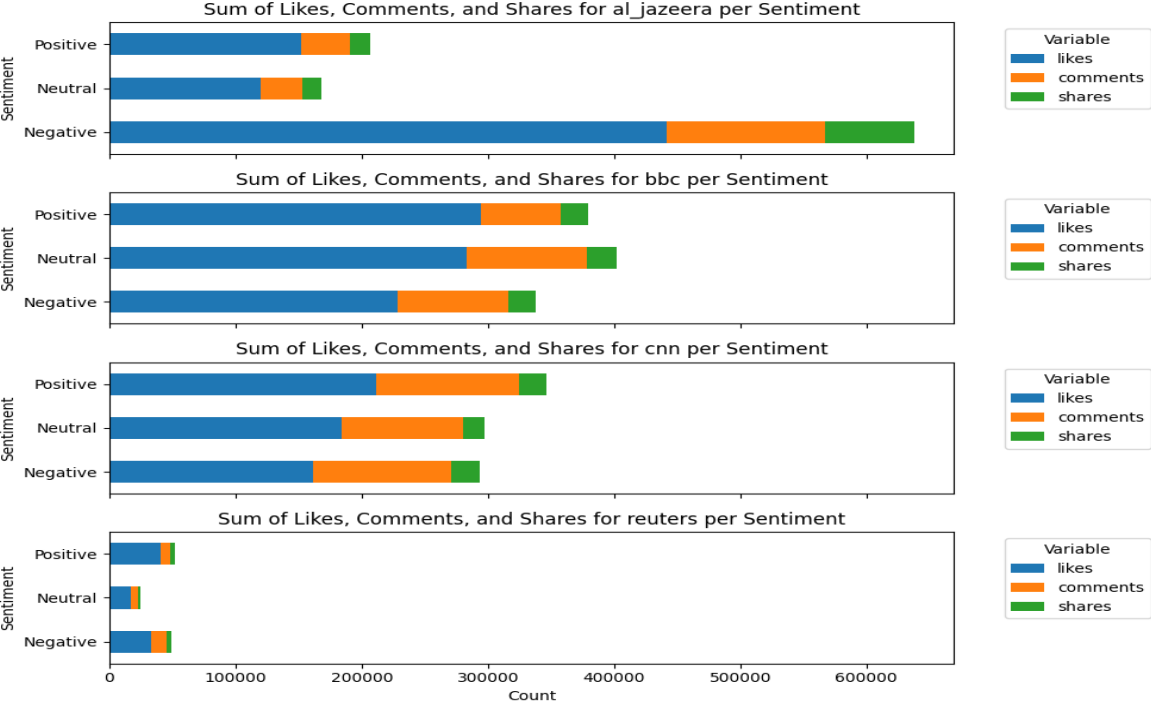


Figure 4.3 Sum of likes, comments and shares per each media's sentiment

For Al Jazeera, the data depicted in Figure 4.3 indicates that posts with a negative sentiment garner higher levels of engagement in terms of likes, comments, and shares. This suggests that the audience of Al Jazeera may be more inclined to interact and participate when confronted with negative news stories, potentially indicating a higher level of emotional investment or interest in critical issues. In contrast, for BBC, CNN, and Reuters, a notable trend emerges where posts with

a positive sentiment tend to attract the highest number of likes. However, it is noteworthy that the number of likes on negative and neutral posts for these channels are not significantly lower, indicating a more balanced engagement across different types of content. This nuanced relationship between sentiment and engagement metrics underscores the complex interplay between news content, audience preferences, and online interactions on social media platforms.

4.4 What are the frequency of Positive and Negative Words used in their post?

4.4.1 What are the Most Common words in a Positive post?



Figure 4.4 Most common words in a Positive post

Figure 4.4 provides insight into the most common words used in positive posts across the analyzed news channels. The visualization highlights the frequency of each word, with larger font sizes indicating higher occurrence rates. Notably, the word "Best" emerges as the most frequently used term, suggesting a prevalent theme of excellence or positivity within the content. Following closely is the word "Voters," indicating a likely focus on electoral or democratic processes in the positive news narratives. The prominence of these words offers valuable insights into the prevalent topics and themes associated with positive news coverage across the analyzed channels, shedding light on the underlying content preferences and editorial priorities shaping audience perceptions.

4.4.2. What are the Most Common words in a Negative post?



Figure 4.5 Most common words in a Negative post

In Figure 4.5, the most common words in negative posts are shown, with font sizes representing their frequency of occurrence. Notably, the word "Plant" emerges as the most frequently used term, suggesting a focus on issues related to flora or industrial facilities within the negative news narratives. Following "Plant" is "Russian," indicating potential references to Russia or Russian-related topics that evoke negative sentiments. Additionally, the word "controlled" appears prominently, hinting at themes related to power dynamics or regulatory oversight in the context of negative news coverage. These findings provide valuable insights into the prevalent topics and themes associated with negative news narratives across the analyzed news channels, offering a glimpse into the issues that elicit unfavorable reactions or emotions among audiences.

4.3. Findings and Discussions

The analysis of sentiment distribution across the four news channels on social media revealed amazing insights into their approaches to content and audience engagement. Al Jazeera's notable emphasis on negative news content, as evidenced by approximately 60% of its posts classified as such, raises concerns about its editorial focus and audience preferences, which was highlighted also by Bakshy et al., (2015). The higher levels of engagement observed for negative posts on Al Jazeera's platform demonstrate the audience's tendency to interact and participate when confronted with critical or opposing news narratives (Tandoc Jr. et al., 2018). This finding suggests a potential alignment between audience preferences and Al Jazeera's editorial direction, emphasising the complex interplay between news content, sentiment, and audience engagement on social media platforms.

In contrast, the BBC's mainly neutral news reflects a balanced approach to news delivery, with an emphasis on objective reporting free of overt emotional bias. The different distribution of attitude in CNN and Reuters' social media posts demonstrates the tactics used by major media outlets to cater to varying audience preferences (Al-Badawi & Najjar, (2021).

Overall, the findings show the relationship between news content, emotion, and engagement among viewers on social media platforms. Understanding audience preferences and responses to various sentiment categories allows news organizations to tailor their content strategies to effectively resonate with their target audience, foster meaningful interactions, and improve overall audience satisfaction and loyalty (Tufekci, 2017). However, news organizations must find a careful balance between catering to audience preferences and maintaining journalistic integrity, ensuring that news material remains useful, accurate, and morally sound in the digital era.

5.0 CONCLUSION

The analysis of sentiment distribution and audience involvement across four major news outlets on social media reveals the modern news consumption behavior. The study reveals that news organizations use a variety of tactics to communicate information and trigger public responses. Al Jazeera's concentration on negative news material, which is associated with higher engagement levels, highlights the necessity of matching editorial focus with audience preferences. In contrast, the BBC's balanced approach to news transmission reflects its dedication to neutrality and objectivity, resulting in constant audience involvement across several sentiment categories. The varying distribution of emotion noticed in CNN and Reuters posts demonstrates the subtle editing tactics used to appeal to differing audience preferences while retaining credibility and relevance.

Moving forward, media outlets must continue to adapt and expand their content strategy in order to effectively engage consumers in an increasingly digital and connected world. They may fine-tune their editorial methods, promote meaningful connections, and cultivate a devoted and educated audience by harnessing insights from sentiment analysis and engagement data. However, in the quest of audience involvement, media outlets must maintain journalistic integrity, accuracy, and ethical standards. Finally, the confluence of data-driven insights and

journalistic ideals is the key to navigating the changing media landscape and assuring news organizations' future relevance and effect in society.

5.1. Limitations of the study

There are a few limitations to this study. Firstly, the study's made use of a secondary data that was scraped from only Facebook posts, this might not give an overall view of the media posts across other platforms. Secondly, the study's focus on social media engagement metrics such as likes, comments, and shares provides a quantitative measure of audience interaction but may not fully capture the qualitative aspects of audience engagement, such as depth of discussion or sentiment expressed in comments. Moreover, the analysis does not account for factors such as timing of posts, frequency of posting, or concurrent events, which may influence audience engagement patterns and sentiment distribution. Finally, the study does not delve into the impact of external factors such as algorithmic changes on social media platforms or broader socio-political contexts on news content and audience engagement.

These limitations should be taken into consideration when interpreting the results of the study, and for further research.

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